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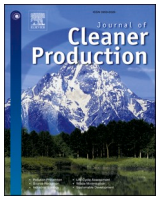

Who owns (un)sustainable companies? Examining institutional determinants of sustainable investing

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ABSTRACT

Sustainable development requires more investment in sustainable companies and less in unsustainable firms. However, the factors driving sustainable investing are not well understood. To address this gap, this paper uses institutional theory to examine three determinants of sustainable investing: (1) investor commitment to sustainable investing initiatives; (2) normative pressure; and (3) home-country influences. The findings indicate that sustainable investing initiatives do not guarantee more sustainable asset allocation among members. Normative pressure correlates with reduced investment in unsustainable companies. Investors from home-countries with legal systems prioritizing diverse stakeholders, and with governments committed to achieving the Sustainable Development Goals (SDGs), tend to invest less in unsustainable companies. Conversely, investors from countries with limited SDG progress show higher investment in unsustainable firms, while those from more developed nations invest more in sustainable companies. These results highlight the need for a critical examination of institutional efficacy in promoting sustainable investing.

1. Introduction

Sustainable investing[1] is amassing scale. Inflows in sustainable investment funds have been record-breaking in recent years (Bloomberg, 2022). Some estimate that as much as 36% of global assets are now invested with some type of sustainability integration (Global Sustainable Investment Alliance, 2021). And although a political backlash to sustainable investing materialized in parts of the United States, a recent survey found that 85 percent of investors believe that sustainability in general, and climate change more specifically, will be important to their investment policy in the coming two years (Robeco, 2023).

This mainstreaming of sustainable investing is imperative because it can support a transition towards more sustainable societies (Crona et al., 2021; Galaz et al., 2018; Keys et al., 2019). One way in which this can be achieved is through asset allocation: channeling financing away from unsustainable and towards sustainable companies (e.g., Bauer et al., 2021; Busch et al., 2016). If this happens on a wide scale, sustainable companies could obtain better, and unsustainable companies worse, access to capital (Berk and van Binsbergen, 2021; Kölbel et al., 2020; Marti et al., 2023). Moreover, sustainable asset allocation can increase the share price of sustainable companies (Heinkel et al., 2001; Pástor et al., 2021). This may incentivize companies to improve their sustainability performance, depending on how financial performance is tied to the company's share price (Davies and van Wesep, 2018).

Understanding whether and why investors invest sustainably is therefore important for sustainable development. Extant research investigated investments in 'sin stocks', which are companies involved in controversial activities like tobacco, alcohol, weapons, and gambling, to understand if social norms influence financial markets (e.g., Hong and Kacperczyk, 2009). Others studied how corporate ownership structure relates to sustainability performance (e.g., Aksoy et al., 2020). Nevertheless, little is known about the drivers of sustainable investing. This is an important gap to fill. Better understanding what drives sustainable investing can inform the creation of investment strategies and public policies that promote sustainability outcomes.

This paper therefore asks: who are the owners of sustainable and unsustainable companies, and what are determinants of sustainable investing? To answer these related research questions, we develop hypotheses that help explain why an investor would allocate more to (un) sustainable companies. We ground our hypotheses in institutional theory, which is argued to be useful for explaining why companies engage with sustainability (van Zanten and van Tulder, 2018). Then we create

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[1] We follow Busch et al. (2016:304) in defining sustainable investing as "investments that seek to contribute toward sustainable development".

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Table 1
Overview of prior literature.

Authors	Year	Name of paper	Name of journal	Key findings
Kim, S., & Yoon, A.	2022	Analyzing Active Fund Managers' Commitment to ESG: Evidence from the United Nations Principles for Responsible Investment.	Management Science	Active US mutual funds do not improve their fund-level ESG score after joining the PRI. PRI funds widely advertise their affiliation and receive a large amount of fund inflows.
Bauckloh, T., Schaltegger, S., Utz, S., Zeile, S., & Zwergel, B	2021	Active first movers vs. late free-riders? An empirical analysis of UN PRI signatories' commitment	Journal of Business Ethics	Initial members of the PRI integrate ESG criteria into their activities significantly more than late joiners of the PRI. This is therefore undermining the PRI's credibility as late joiners are free-riding.
Hong, H., & Kacperczyk, M.	2009	The price of sin: The effects of social norms on markets.	Journal of Financial Economics	Social norms in financial markets affect the ownership, financial return, and analyst coverage of sin-stocks (companies producing alcohol, tobacco, and gaming). Sin-stocks are held less by more-norm constrained investors (pension funds, insurance companies, endowments, and banks) than less-norm constrained investors (hedge funds, mutual funds, and individual investment advisors). Sin stocks have a higher financial return and receive less coverage from analysts than comparable stocks.
Blitz, D., & Swinkels, L.	2021	Who owns tobacco stocks?	Journal of Asset Management	More-norm constrained investors (pension funds and sovereign wealth funds) underweight tobacco stocks. US and UK investors overweight tobacco stocks while European (ex. UK) investors underweight tobacco stocks, suggesting cultural differences.
Liang, H., & Renneboog, L.	2017	On the foundations of corporate social responsibility	The Journal of Finance	A company's CSR performance and country's legal system are strongly correlated. Companies in common law systems have lower CSR performance while for companies in civil law systems it is the opposite.
Dasgupta, S., Mody, A., Roy, S., & Wheeler, D.	2001	Environmental regulation and development: A cross-country empirical analysis.	Oxford Development Studies	Continuous positive relationship between environmental regulation and economic development. Environmental regulation does not surface during the middle stages of development. Protection of land and resources precede protection of water and air.
Alda, M.	2021	The environmental, social, and governance (ESG) dimension of firms in which social responsible investment (SRI) and conventional pension funds invest: The mainstream SRI and the ESG inclusion.	Journal of Cleaner Production,	Conventional pension funds are increasingly incorporating firms with certain ESG criteria, aligning with the practices of socially responsible investment (SRI) funds. SRI funds maintain higher ESG standards and retain their ethical focus, without compromising performance, while the integration of ESG criteria into conventional funds is a developing trend over time.
Gangi, F., Varrone, N., Daniele, L. M., & Coscia, M.	2022	Mainstreaming socially responsible investment: Do environmental, social and governance ratings of investment funds converge?	Journal of Cleaner Production,	Low convergence between ESG ratings of investment funds.
Matten, D., & Moon, J.	2008	"Implicit" and "explicit" CSR: A conceptual framework for a comparative understanding of corporate social responsibility.	Academy of Management Review	The authors argue that the differences in CSR among countries can be explained by the implicit and explicit dimensions of CSR, which are shaped by the institutional context of each country. Common law systems focus on explicit CSR policy and shareholder wealth creation while civil law systems focus on implicit CSR policy and societal stakeholders.
Sarkodie, S. A., & Strezov, V.	2019	A review on environmental Kuznets curve hypothesis using bibliometric and meta-analysis.	Science of the Total Environment	Meta-analysis on environmental Kuznets curve – inverted u-shaped relationship between environmental pollution and income levels. Turning point is an income of US$8910. For low-income countries, the relationship between environmental stress and income tends to be monotonic as they focus on meeting their basic needs.
Tariq, A., & Hassan, A.	2023	Role of green finance, environmental regulations, and economic development in the transition towards a sustainable environment.	Journal of Cleaner Production	Green finance has a significant impact on a country's environmental sustainability. This is moderated by the role of environmental regulation. Introduction of environmental policies positively affects environmental sustainability.

three samples: (1) *unsustainable* companies that cause social and/or ecological harm; (2) *sustainable* companies that provide solutions for improving human and/or planetary wellbeing; and (3) *neutral* companies that have no significant impacts on sustainable development. We collect data on these companies and about the investors that own their equity shares. With a regression model we then test our hypotheses, thereby unearthing institutional determinants of sustainable investing.

We find that only few investors have substantial ownership of both unsustainable and sustainable companies. This is a result of market concentration in the investment industry. Nevertheless, there is significant variety in the extent to which an individual investor finances (un) sustainable companies. Our analysis reveals how important each of three types of determinants are in explaining if an individual investor invests more/less in (un)sustainable companies relative to its ownership of netural firms.

First, we find that *sustainable investing initiatives* have little influence on ownership of (un)sustainable companies. Surprisingly, investors that commit to industry-level sustainable investing initiatives, like the Principles for Responsible Investment (PRI), the Insitutional Investors Group on Climate Change (IIGCC) and Net Zero alliances, invest more in unsustainable companies. This raises questions about the effectiveness of sustainability initiatives in redirecting financing away from unsustainable companies. Second, we find that *normative pressure* can lead to lower investments in harmful activities. Investors that face high

normative pressure, like sovereign wealth funds, invest less in unsustainable companies than investors with few normative constraints, such as hedge funds. Third, an investor's *country of origin* relates to investment behavior. Investors from civil law systems invest less in unsustainable companies than those from common law backgrounds. Additionally, investors from countries that are more committed to the SDGs invest less in unsustainable companies, while those from less committed nations invest more in sustainable companies. Investors from countries closer to achieving the SDGs invest more in sustainable firms, while those far from reaching these goals invest more in unsustainable companies. Green central banking policies in a country do not impact ownership of sustainable or unsustainable companies. Our analysis underwent robustness tests, yielding consistent results.

Overall, this paper contributes an institutional perspective to the sustainable investing literature, with theoretical and managerial implications. We argue that multiple institutions can affect sustainable investing behavior, by encouraging lower ownership of unsustainable companies and higher ownership of sustainable ones. Nevertheless, not all institutions succeed in achieving this twin ambition. We show whether specific institutions are associated with lower/higher investments in (un)sustainable companies. This invites further research and policy aimed at better connecting the intentions and outcomes of sustainable investing institutions.

The next section develops the hypotheses that guide the empirical analysis. Section 3 describes the creation of samples of sustainable, unsustainable, and neutral companies, explains what data are used, and describes the models. The results and their implications are presented in sections 4 and 5. The last section offers conclusions. This paper builds on studies from various disciplines. We give a summarized overview of this literature in Table 1.

2. Development of hypotheses

We develop hypotheses that can help explain whether investors finance (un)sustainable companies. To do this, we draw from institutional theory. Institutions can be understood as the formal and informal "rules of the game" (North, 1990). Institutional theory broadly distinguishes between formal rule systems enforced by the state (regulative institutions), rules emanating from professional societies that set roles and expectations for their groups (normative institutions), and norms and values (cultural-cognitive institutions) (Scott, 1995). Abiding by institutions gives agents, like investors, legitimacy through coercive, mimetic, and normative isomorphic processes (DiMaggio and Powell, 1983). Consequently, formal and informal institutions shape the behavior of people and organizations.

Institutionalism helps explain how and why organizations engage with sustainable development. Among others, prior research analyzed how institutional theory can help explain how multinational enterprises engage with the SDGs (van Zanten and van Tulder, 2018), why companies engage in socially responsible behavior (Campbell, 2007), and how institutions influence corporate sustainability (Bansal, 2005). Building on such prior studies, we assess how several types of regulative, normative, and cultural-cognitive institutions may be determinants of sustainable investing.

2.1. Investor commitment to sustainable investing initiatives

We first focus on the role of normative institutions in shaping sustainable investing. Various sustainable investing initiatives have gained prominence in the investment industry in recent years. Relevant examples are the PRI, a UN-backed initiative committing its 4902 signatories (together managing US$ 121 trillion) to invest in line with six responsible investment principles (PRI, 2023), the IIGCC that induces 344 signatory-investors to collaborate on climate change, and the Net Zero (NZ) alliances connecting 247 members among asset owners, insurers, and asset managers, that aim to make investment portfolios consistent with limiting global warming to 1.5 °C. Because they set roles and expectations for their signatories, sustainable investing initiatives can be understood as normative institutions.

By committing to sustainable investing initiatives, an investor signals to support sustainable development ambitions. Although investors might commit to such initiatives without implementing more sustainable investing practices (e.g., Kim and Yoon, 2022), our base assumption is that, as a normative institution, sustainable investing initiatives induce their committers invest more sustainably than non-committers:

Hypothesis 1. Investors that are committed to sustainable investing initiatives invest more in sustainable, and less in unsustainable, companies compared to investors that do not commit to such sustainability initiatives.

2.2. Normative pressure on investors

We then address the influence of cultural-cognitive institutions on sustainable investing. It is well-known that social norms influence investment practices (Hong and Kacperczyk, 2009).[2] For example, social norms against financing companies promoting human vice, like addiction and violence, spurred discussions around excluding investments in 'sin stocks' (Blitz and Swinkels, 2021; Hong and Kacperczyk, 2009). More recently, investors started shunning stocks with high carbon emissions (Trinks et al., 2018; Chambers et al., 2020).

But not all investors experience equal pressure to comply with social norms. Some, like pension funds, sovereign wealth funds, and insurance companies, have been argued to face significant normative pressure due to the public nature of their investments, their exposure to societal scrutiny, and their diverse constituencies (Hong and Kacperczyk, 2009). Members of pension funds for instance want their fund to expand its engagement with SDGs, even if this hurts financial performance (Bauer et al., 2021). As a result, investors that face significant normative pressure must balance risk, return, and alignment with moral values.

This contrasts less norm-constrained investors, like hedge funds, mutual funds, and investment advisors. Such investors are primarily motivated by financial objectives (Cahan et al., 2017) and can take bets on individual investments. For instance, hedge funds employ complex strategies, have lower levels of transparency, disclosure, and regulatory oversight, which presents potential for opportunistic behavior and less concerns for responsible investing (Liang et al., 2022). Catering to select clients rather than the public leads them to face fewer constraints in aligning investments with social norms.

We therefore propose that cultural-cognitive institutions influence sustainable investing in the following way:

Hypothesis 2. Investors that face more normative pressure invest less in unsustainable, and more in sustainable, companies compared to investors facing less normative pressure.

2.3. Home-country influences on sustainable investing

Sustainable investment practices can be shaped by the regulative institutions of an investor's home country (Sandberg et al., 2009). This home country is likely to be the place where both investment and sustainability strategies are developed. This also is where investors face extensive regulatory oversight. We examine four country characteristics.

Firstly, a country's legal system can affect how companies consider sustainability factors. Previous literature distinguishes between investors from countries with common law systems (e.g., US, UK), and civil law systems (e.g., Germany, France, Scandinavia) (La Porta, 1996; Liang and Renneboog, 2017). This classification is similar to the

[2] Social norms are actions whose utility to the agent performing it depends in some way on the beliefs or actions of other members of the community (Akerlof, 1980; Hong and Kacperczyk, 2009).

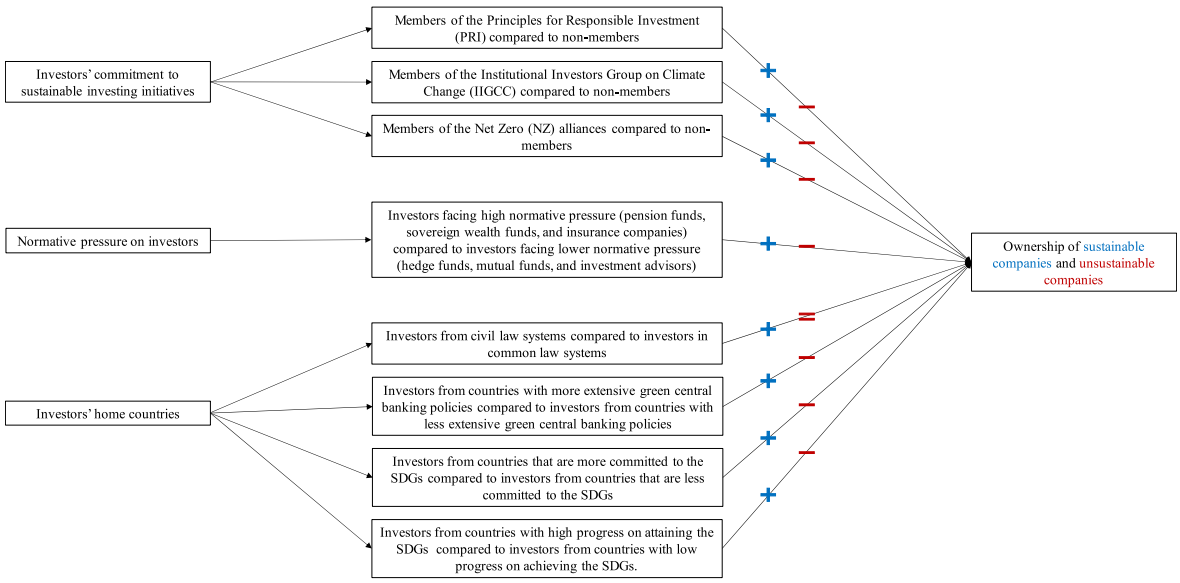
Investors' commitment to sustainable investing initiatives
Members of the Principles for Responsible Investment (PRI) compared to non-members
Members of the Institutional Investors Group on Climate Change (IIGCC) compared to non-members
Members of the Net Zero (NZ) alliances compared to non-members
Normative pressure on investors
Investors facing high normative pressure (pension funds, sovereign wealth funds, and insurance companies) compared to investors facing lower normative pressure (hedge funds, mutual funds, and investment advisors)
Investors' home countries
Investors from civil law systems compared to investors in common law systems
Investors from countries with more extensive green central banking policies compared to investors from countries with less extensive green central banking policies
Investors from countries that are more committed to the SDGs compared to investors from countries that are less committed to the SDGs
Investors from countries with high progress on attaining the SDGs compared to investors from countries with low progress on achieving the SDGs.
Ownership of sustainable companies and unsustainable companies

Fig. 1. | Conceptual framework. Symbols "+", "−", and " = " are used to represent different relationships between the determinants and the ownership of companies. In this context, "+" suggests a higher ownership, "−" suggests a lower ownership, and " = " suggests an equal ownership of (un)sustainable companies relative to neutral peer companies. Blue symbols represent the relationship for sustainable companies, while red symbols represent the relationship for unsustainable companies. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

established distinction between liberal and coordinated market economies (Hall and Soskice, 2001). Common law systems emphasize shareholder wealth creation and adopt a reactive sustainability approach (Matten and Moon, 2008) that is characterized by a liability orientation (Doh and Guay, 2006). In contrast, civil law systems serve a broader range of stakeholders and are more proactive in addressing sustainability (Matten and Moon, 2008). It can therefore be expected that investors from civil and common law systems both seek to avoid harm, while those from civil law systems aim to more proactively 'do good' (van Zanten and van Tulder, 2018). Based on this, we propose:

Hypothesis 3a. Investors from countries with civil law systems invest more in sustainable companies, and similarly in unsustainable companies, compared to investors from countries with common law systems.

Secondly, we investigate if the extent to which a country implements green central banking policies influences ownership of (un)sustainable companies. Central banks are typically responsible for monetary policy, which influences the supply and demand of money and credit in an economy, and for supervising domestic financial systems. Increasingly, central banks are investigating the implications of sustainability for the financial system. Various central banks now have implemented policies that encourage investments in sustainable activities (Campiglio et al., 2018). Such green central banking policies are part of a country's institutional framework. These may induce investors to invest more sustainability:

Hypothesis 3b. Investors from countries with more extensive green central banking policies invest more in sustainable, and less in unsustainable, companies compared to investors from countries with less extensive green central banking policies.

Thirdly, we determine if a government's commitment to sustainable development affects sustainable investing behavior. Countries that are more committed to sustainable development, as for instance witnessed by whether countries have a strategy, budget, lead, and review for attaining the SDGs (Sachs et al., 2022), could directly or indirectly motivate their investors to invest more sustainably. For instance, governments that support sustainable development can be expected to also implement regulations affecting sustainable investments. Prior literature for instance found that carbon pricing schemes or feed-in-tariffs positively impact green investment (Azhgaliyeva et al., 2019; Eyraud et al., 2013). Our hypothesis is:

Hypothesis 3c. Investors from countries that are more committed to the SDGs invest more in sustainable, and less in unsustainable, companies compared to investors from countries that are less committed to the SDGs.

Lastly, we study if investors from countries that are closer to attaining the SDGs invest more sustainably than investors from countries that are less progressed in meeting the SDGs. Countries with more progress on sustainable development typically have stronger and longer existing sustainability regulation (Dasgupta et al., 2001). Investors in more developed countries are therefore likely to face regulatory and normative pressure to prevent negative and promote positive impact. At the same time, less developed countries could have regulations that encourage investment in more polluting sectors in the short-term to deliver basic needs (Sarkodie and Strezov, 2019). The 'common but differentiated responsibilities' principle agreed by signatories to the Paris Agreement is an example of this notion. We therefore propose:

Hypothesis 3d. Investors from countries that have better progress on attaining the SDGs invest more in sustainable, and less in unsustainable, companies compared to investors from countries that have worse progress on achieving the SDGs.

3. Methods

The developed hypothesis informs the design of our study. The conceptual framework is provided in Fig. 1. Below we explain our methodology.

3.1. Samples

To test our hypotheses, we create samples of sustainable, unsustainable, and neutral companies. Various sustainability rating systems are available to assess company sustainability (Cort and Esty, 2020). The most used are Environmental, Social, and Governance (ESG) ratings (Alda, 2021; Linnenluecke, 2022; Popescu et al., 2021). However, ESG ratings of different providers are not correlated, leading to confusion about companies' sustainability performance (Berk and van Binsbergen,

2021; Gangi et al., 2022). ESG ratings also fail to accurately identify (un) sustainable companies according to investors, regulators, and scientists (van Zanten and Huij, 2022). This highlights subjectivity in determining corporate sustainability. To address this, we construct our samples using multiple dimensions of (un)sustainability.

3.1.1. Unsustainable companies

We define unsustainable companies as companies that harm social and/or ecological wellbeing. To be included in this sample, a company must meet multiple criteria. First, the company must have a medium or high negative impact on the SDGs, assessed using the Robeco SDG score[3] (van Zanten and Huij, 2022). Additionally, the company must meet at least one of the following: (1) being excluded from the investment universe by at least 5 of the 28 asset owners analyzed for sustainability reasons, like producing controversial weapons, tobacco, or thermal coal (see Annex 1); (2) ranking among the 100 companies with the highest scope 1 and 2 greenhouse gas (GHG) intensity, and the top 100 firms with the highest scope 3 GHG intensity, using GHG data from TruCost and revenue data from Bloomberg; or (3) causing significant harm according to the EU taxonomy, a landmark European sustainable investing regulation, using Sustainalytics data.

This sample of unsustainable companies includes 286 companies with a total market value of USD 4119 billion.

3.1.2. Sustainable companies

We define sustainable companies as companies that support social and/or ecological wellbeing. To be included in this sample, companies must meet multiple criteria. Firstly, the company must have medium or high positive impact on the SDGs, again measured using the Robeco SDG score. Moreover, they must meet at least one of the following: (1) being included in one or more of 15 sustainable thematic investment funds/ETFs that aim to invest in companies providing solutions related to renewable energy, water, and healthcare (see Annex 2); and (2) generating over two-thirds of revenues from activities aligned with the EU taxonomy, which helps mitigate and/or adapt to climate change, based on data from Sustainalytics.

The sample of sustainable companies includes 351 companies with a market value of USD 7112 billion.

3.1.3. Neutral companies

Neutral companies are defined as companies that have no strong positive or negative impact on the SDGs. From the MSCI All Country World Index[4] we pick companies with a Robeco SDG score of 0, which indicates neutral contributions to these goals. Additionally, these companies cannot meet any of the other criteria used to create the unsustainable and sustainable samples.

477 companies with a market value of USD 4881 billion make up this sample.

3.2. Data

We collect data for the period 2012–2022 for all companies in the three samples. From Bloomberg, each company's market capitalization (annual), book value (annual), returns (monthly), share price (monthly), (sub)industry (according to the GICS classification), and the country of domicile are collected. A list of the fifty largest investors in each company (annual) is retrieved through Thomson Reuters.

For each of the identified investors we collect, from Thomson Reuters, for the period 2012–2022: the percentage of shares that they own in the sample companies; the value of their shares; what type of investor it is (e.g., pension fund, hedge fund, insurance company etc.); and the country in which the investor is located. Subsidiary investors are grouped with their parent company by summing their ownership percentages and value, but only if the subsidiary investor is of the same investor type as the parent. Investors with zero percent ownership in a company are removed.

To assess if sustainability initiatives, normative pressures, and home countries have an influence on the sustainable investment behavior of investors, additional information about the investors is collected. An overview of these data and the method to measure each construct is shown in Table 2.

First, we determine if investors are committed to important sustainable investing initiatives, including the PRI, IIGCC and the Net Zero alliances. For PRI signatories, we also retrieve the year in which an investor committed to these principles.

Second, we create a binary variable that gauges how much normative pressure each type of investor faces. By building on prior literature (Blitz and Swinkels, 2021; Hong and Kacperczyk, 2009; Sagbakken and Zhang, 2022) we specify pension funds, sovereign wealth funds, and insurance companies as facing more normative pressure, and hedge funds, mutual funds, and investment advisors, as facing less normative pressure.

Finally, we collect four types of information about investors' home countries. First, based on earlier studies (La Porta, 1996; Liang and Renneboog, 2017) we classify countries into common law systems (those with English origins) and civil law systems (those with French, German and Scandinavian orientations). Second, we use the Green Central Banking scorecard (Green Central Banking, 2022) to judge if countries have more (grades B-C) or less (grades D-F) extensive green central banking policies. Third, we use the 2022 SDG Index (Sachs et al., 2022) to determine to what extent countries are committed to the SDGs. Countries with high, moderate, and low and very low SDG commitment are respectively grouped as having high, moderate, and low commitment to the SDGs. Fourth, we use the same SDG Index to gauge how well countries are on track to achieving the SDGs. The index ranges from 0 to 100 and can be understood as a percentage, whereby 100 indicates that a country achieved all SDGs. We create percentiles of these scores for each year to form three groups: high (top-33%), medium (middle-33%), and low (bottom-33%) SDG-rated countries.

3.3. Model

We adopt a hierarchical approach to developing our model. The main model contains explanatory variables that align with the hypotheses to determine the drivers of ownership of (un)sustainable companies. Control variables are then added to the model to see if the explanatory variables remain relevant. Finally, fixed effects are added to the model to control for potential influences of unobservable variables.

To evaluate investors' ownership of (un)sustainable companies we build on prior literature that evaluates ownership of 'sin stocks''using empirical models (Hong and Kacperczyk, 2009; Sagbakken and Zhang, 2022). Equation (1) describes our main model:

$$Ownership_{j,c,t} = \alpha_0 + \alpha_1 UnsustainableDummy_{c,t} + \alpha_2 SustainableDummy_{c,t} + \boldsymbol{\varepsilon}_{c,t} \quad (1)$$

where $Ownership_{j,c,t}$ is the fraction of shares of company c held by investor type j (e.g., member/non-member of a sustainability initiative; more/less normative pressure; etc.) at the end of year t. α_0 is the intercept term and measures the average yearly ownership of neutral companies by an investor type. The main coefficients of interest are α_1, and α_2. $UnsustainableDummy_{c,t}$ is a dummy variable equal to 1 if a company is part of the unsustainable company sample and 0 otherwise;

[3] The Robeco SDG score aims to measure the positive and negative impacts of companies on the SDGs. This score is available for free for research purposes via the Robeco Open Access initiative (openaccess@robeco.com)

[4] This index contains over 2900 large- and mid-cap constituents from 23 developed and 25 emerging markets, across 11 sectors and cover some 85% of the free float-adjusted market capitalization in each market, thereby constituting a representative sample of investable companies.

Table 2
Data for determinants of ownership of (un)sustainable companies.

Determinants	Parameter	Source	Data collected	Rationale	Method
Investors' commitment to sustainable investing initiatives	Principles for Responsible Investment (PRI)	PRI website	Investor name & joining date	Committing to the PRI signals commitment to broad sustainable investing principles. We therefore compare if signatories to the PRI invest more sustainably than non-signatories.	Two groups are created by matching the PRI list of investors to our sampled investors: **1. PRI**. Investors that signed the PRI **2. Non-PRI.** Investors that did not sign the PRI Date of signing was considered in this classification.
	Institutional Investors Group on Climate Change (IIGCC)	IIGCC website	Investor name	Members of the IIGCC commit to incorporate net zero and climate change characteristics through their investment practices. We therefore compare if signatories to the IIGCC invest more sustainably than non-signatories.	Two groups are created by matching the IIGCC list of investors to our sampled investors: **1. IIGCC**. Investors that signed the IIGCC **2. Non-IIGCC.** Investors that did not sign the IIGCC As IIGCC does not provide joining date, it is assumed that membership remains constant over sample period (2012–2022).
	Net Zero (NZ) Alliances: - Net Zero Asset Owner Alliance - Net Zero Insurance Alliance - Net Zero Asset Managers Initiative	Respective websites	Investor name	Members of the NZ alliances are committed to support the goal of net zero by 2050 or sooner. We therefore compare if signatories to the NZ invest more sustainably than non-signatories.	Two groups are created by matching the NZ list of investors to our sampled investors: **1. NZ**. Investors that signed the NZ **2. Non-NZ.** Investors that did not sign the NZ As NZ does not provide joining date and it was established recently (2019–2021 depending on the alliance), it is assumed that membership remains constant over sample period (2012–2022).
Investors' commitment to sustainable investing initiatives (continued)	All SI initiatives			Investors that signed the PRI, IIGCC, and NZ alliances are the frontrunners in committing to sustainability. We therefore compare if signatories to all SI initiatives invest more sustainably than non-signatories.	Two groups are created: **1. All SI initiatives**. Investors who signed the PRI, IIGCC, *and* NZ **2. No SI initiatives.** Investors who did not sign the PRI, IIGCC, *or* NZ
Normative Pressure	High/low normative pressure	Thomson Reuters	Type of investor	Prior literature (Blitz and Swinkels, 2021; Hong and Kacperczyk, 2009; Sagbakken and Zhang, 2022) explains that different investor types face different pressure for following social norms. This normative pressure makes them avoid unsustainable stocks such as 'sin stocks'. We therefore compare if investors facing high normative pressure invest more sustainably than non-signatories.	Two groups are created: **1. High normative pressure.** Investor types: pension funds, sovereign wealth funds, and insurance companies **2. Low normative pressure.** Investor types: hedge funds, mutual funds, and investment advisors
Investors' home countries	Legal system	Thomson Reuters	Country the investor is located in	A country's legal system can affect how companies consider and implement sustainability factors. Therefore, we compare if investors in civil law systems invest more sustainably than investors in common law systems.	Based on earlier studies (La Porta, 1996; Liang and Renneboog, 2017) countries are classified into common law systems and civil law systems. Two groups are created: **1. Common law.** Investors in common law systems **2. Civil law.** Investors in civil law systems.
Investors' home countries (continued)	Green banking policies	Green Central Banking scorecard	Country and grade given	Investors in countries with extensive green banking policies may induce investors to invest more sustainably. We therefore compare if investors in countries with more extensive green central banking policies invest more sustainably than investors in countries with less extensive green central banking policies.	Two groups are created: **1. More extensive green central banking policies.** Countries with grades B-C. **2. Less extensive green central banking policies**. Countries with grades D-F.
	SDG commitment	SDG Index	Governments' commitments and efforts for the SDGs scores	Countries that are more committed the SDGs could directly or indirectly motivate their investors to invest more sustainably. We therefore compare if investors in countries with high commitment to the SDGs invest more sustainably than investors in countries with low commitment to the SDGs.	Based on the 2022 SDG Index report, countries are classified into three groups: **1. High**. Countries characterized with "high SDG commitment." **2. Moderate**. Countries characterized with "moderate SDG commitment." **3. Low**. Countries characterized with "low SDG commitment" or "very low SDG commitment."

(*continued on next page*)

Table 2 (*continued*)

Determinants	Parameter	Source	Data collected	Rationale	Method
	SDG progress	SDG index	SDG Index score	Countries with more progress on sustainable development have strict and longer lasting sustainability regulation. Less developed nations may prioritize short-term needs, promoting investment in polluting sectors. We compare if investors in high-progress SDG countries make more sustainable investments than those in low-progress countries.	SDG Index provides yearly updated scores. For each year, percentiles of the scores is taken to form three groups: **1. High**. Top 33% of all scores. **2. Medium**. Middle 33% of all scores. **3. Low**. Bottom 33% of all scores. As the SDG Index did not create scores before 2016, it is assumed that the 2016 scores remain stable for the period 2012–2015.

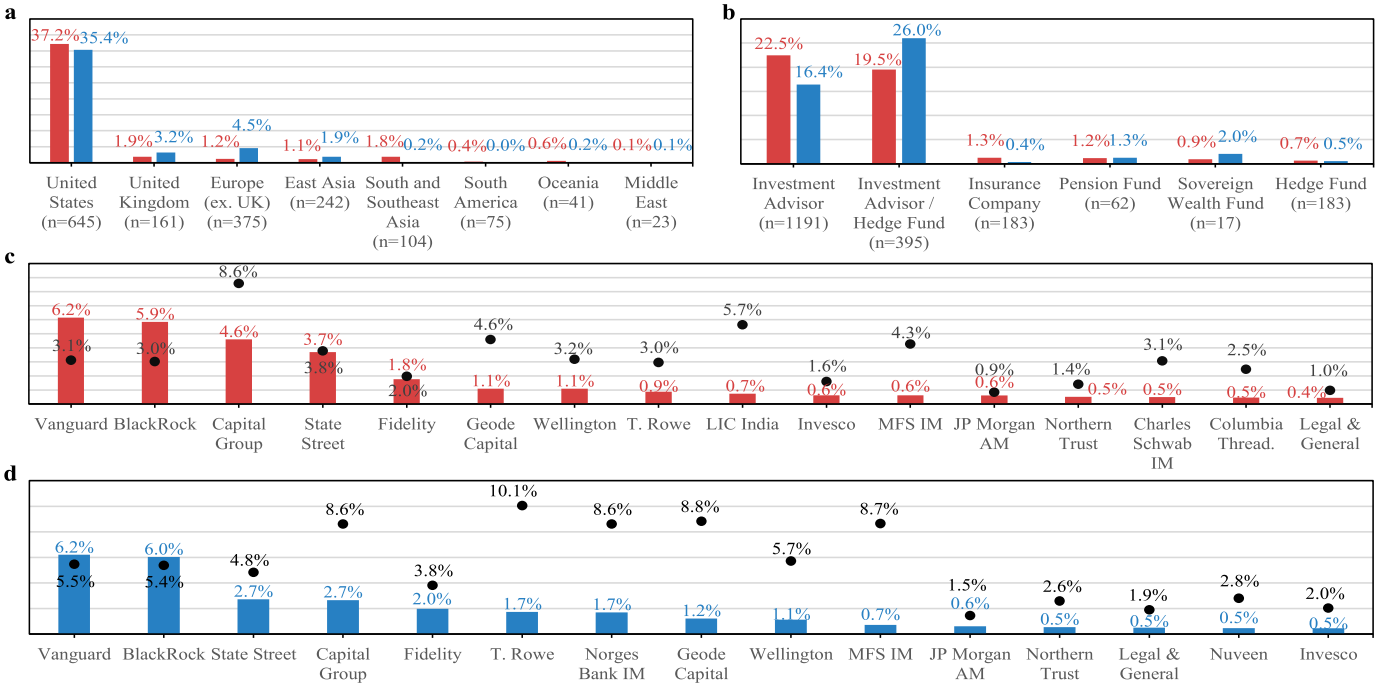

Fig. 2. | Investors in (un)sustainable companies (2022). Red and blue respectively represent unsustainable (n = 286) and sustainable companies (n = 351). Columns show ownership of (un)sustainable companies divided by the market capitalization of all companies in each sample. Black dots show the total value that an investor owns of (un)sustainable companies, divided by that investor's assets under management. **a**, Ownership of (un)sustainable companies by investors located in a particular country and region. **b,** ownership of (un)sustainable companies by investors of distinct types. **c,** the 15 top owners of unsustainable companies. **d,** the 15 top owners of sustainable companies. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

$SustainableDummy_{c,t}$ is a dummy variable equal to 1 if a company is part of the sustainable company sample and 0 otherwise. Hence, α_1 measures the preference or aversion of an investor type j towards unsustainable companies over the reference group (neutral companies). α_2 measures the preference or aversion of an investor type j towards sustainable companies over neutral peer companies.

This assesses if investors prefer financing unsustainable or sustainable firms. $\boldsymbol{\varepsilon}_{c,t}$ is the error term. Comparing investors' ownership of (un) sustainable companies relative to ownership of neutral companies allows for comparing the asset allocation behavior of investors of varied sizes (in terms of their assets under management (AUM)), while controlling for the differences in market capitalization of the sample companies.

In addition to the main model, a more extensive model is created that controls for firm-level characteristics, specified by Equation (2):

$$Ownership_{j,c,t} = \alpha_0 + \alpha_1 UnsustainableDummy_{c,t} + \alpha_2 SustainableDummy_{c,t} + \boldsymbol{\alpha}_2 \boldsymbol{X}_{c,t} + \boldsymbol{\varepsilon}_{c,t} \quad (2)$$

$Ownership_{j,c,t}$, $UnsustainableDummy_{c,t}$, and $SustainableDummy_{c,t}$ have the same definition and interpretation as in equation (1). $\boldsymbol{X}_{c,t}$ is a vector of firm-level variables including: $LogSize_{c,t}$ (logarithm of company c's market capitalization at end of year t), $LogMB_{c,t}$ (logarithm of company c's market capitalization divided by its book value at end of year t), $InvPrice_{c,t}$ (inverse of company c's share price at end of year t), $SDReturn_{c,t}$ (standard deviation of daily returns of company c's stock during year t), $AvgReturn_{c,t}$ (average monthly return of company c's stock during year t).

We then add year- and country-fixed effects to control for non-observable factors that could explain the variation in ownership shares among investor types across time and geographies (e.g., varying reporting standards or legal frameworks). The model is described by Equation (3):

$$Ownership_{j,c,t} = \alpha_0 + \alpha_1 UnsustainableDummy_{c,t} + \alpha_2 SustainableDummy_{c,t} + \boldsymbol{\alpha}_2 \boldsymbol{X}_{c,t} + \lambda_{y,t} + \tau_{y,t} + \boldsymbol{\varepsilon}_{c,t} \quad (3)$$

where $\lambda_{y,t}$ is year-fixed effects and $\tau_{y,t}$ is country-fixed effects. All other terms have the same definition and interpretation as in Equations (1) and (2).

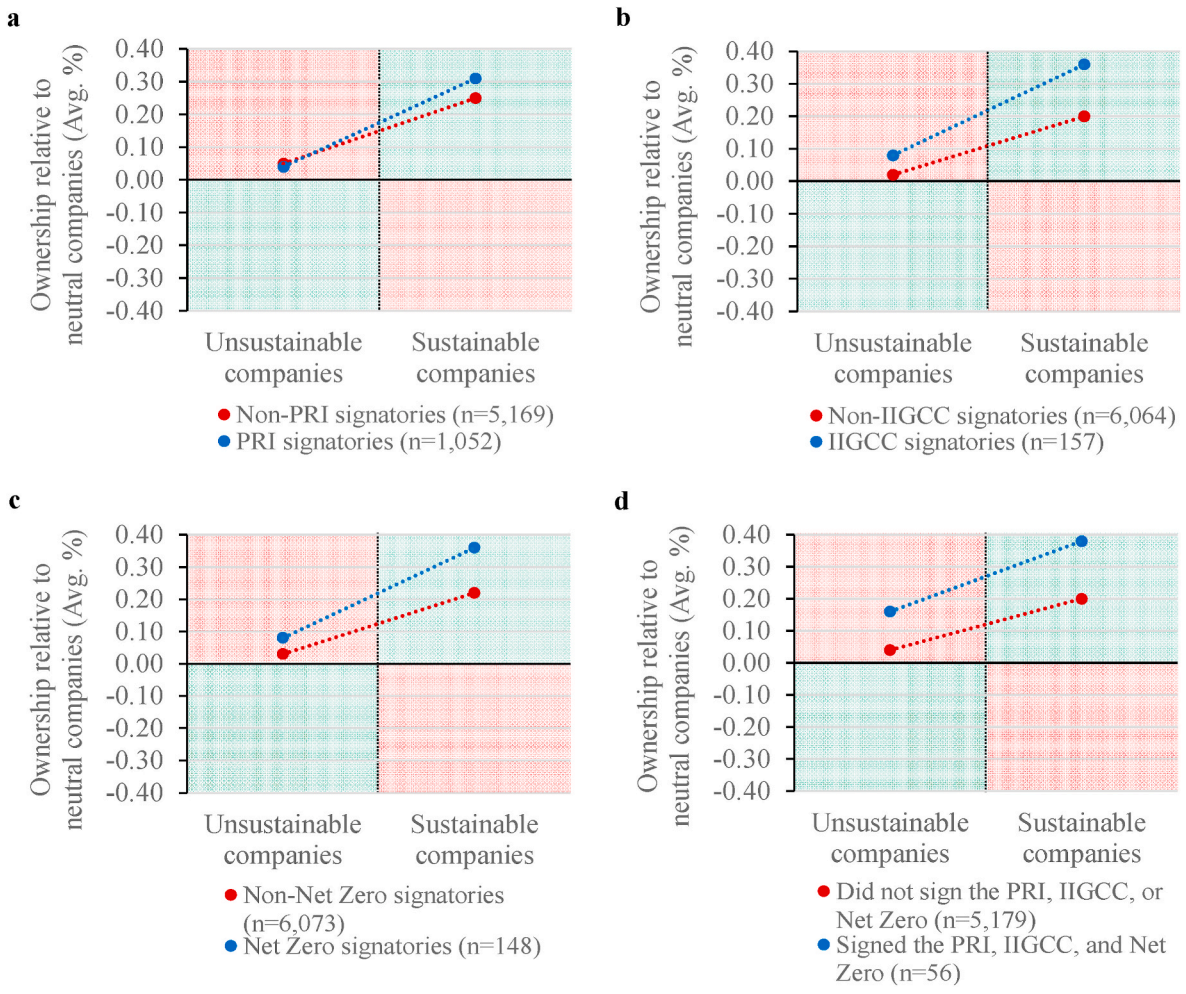

Fig. 3. | Investors' commitment to sustainable investing initiatives. These graphs display ownership of unsustainable (n = 286) and sustainable companies (n = 351) relative to companies with neutral sustainability impacts (n = 477), comparing investors that are: **a,** non-PRI signatories (red) and PRI signatories (blue); **b,** non-IIGCC signatories (red) and IIGCC signatories (blue); **c,** non-Net Zero Alliance(s) signatories (red) and Net Zero Alliance(s) signatories (blue); **d,** investors that committed to none of these sustainable investing initiative (red) and investors that committed to all sustainable investing initiatives (blue). Green fields signal sustainable investment behavior: investors that respectively invest less in unsustainable and more in sustainable companies relative to neutral peer companies. Red fields signal that investors overweight and underweight unsustainable and sustainable companies. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

4. Results

Fig. 2 describes investors in (un)sustainable companies. Measured by each investor's ownership of (un)sustainable companies relative to the aggregated market value of these companies, we find that investors from Europe, East Asia, and the United Kingdom invest more of their assets in sustainable companies relative to those that are unsustainable. In contrast, investors based in the United States, South and Southeast Asia, and Oceania allocate more financing to unsustainable companies.

Financing of (un)sustainable companies furthermore differs per type of investor. Sovereign wealth funds, pension funds, and investors providing investment advice as well as hedge fund services, invest more in sustainable companies. Investment advisors, insurance companies, and hedge funds have greater ownership of unsustainable companies.

Fig. 2c/d reveals the 15 largest investors in (un)sustainable companies. Five investors, Blackrock, Capital Group, Fidelity Management & Research, State Street Global Advisors, and Vanguard, jointly own 22.1% of the total market value of our sample of unsustainable companies, and 19.6% of sustainable companies. The figure also shows the proportion of an investor's total AUM allocated to (un)sustainable firms. Some investors, like Capital Group, invest a high portion of their assets in unsustainable companies. Others, like T. Rowe Price Associates, allocate more to sustainable firms.

The next sections explore why investors allocate more to (un)sustainable companies. The analysis focuses on individual investors' ownership of (un)sustainable companies relative to their ownership of companies with neutral sustainability impacts. This enables testing whether investors prefer financing unsustainable or sustainable firms in comparison to their ownership of neutral companies.

4.1. Investor commitment to sustainable investing initiatives

We find that sustainable investing initiatives do not strongly induce their members to invest more sustainably. Fig. 3 compares two groups of investors – those that have and those that have not committed to sustainable investing initiatives – in terms of their ownership of unsustainable and sustainable companies.

The graphs show the difference in ownership of (un)sustainable companies relative to investors' ownership of neutral companies using the regression results of Equation (1). The green fields signal sustainable investing patterns, indicating less investment in unsustainable and more investment in sustainable companies. The red squares signal that investors invest more in unsustainable and less in sustainable companies.

Signatories to sustainable investing initiatives have a similar

Table 3
Investors' commitment to sustainable investing initiatives.

	Non-PRI			PRI			Non-IIGCC			IIGCC		
	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3
Intercept	0.65***	0.35***	0.55***	0.76***	0.28***	0.35***	0.63***	0.36***	0.55***	0.80***	0.40***	0.47***
	(0.01)	(0.03)	(0.03)	(0.01)	(0.06)	(0.05)	(0.01)	(0.03)	(0.02)	(0.01)	(0.05)	(0.05)
UnsustainableDummy	0.05***	0.09***	0.01	0.04***	0.14***	0.10***	0.02***	0.05***	0.01	0.08***	0.08***	0.09***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
SustainableDummy	0.25***	0.19***	0.15**	0.31***	0.21***	0.22***	0.20***	0.16***	0.13***	0.36***	0.24***	0.25***
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
LogSize		0.03***	0.01***		0.05***	0.04***		0.02***	0.00		0.03***	0.03***
		(0.00)	(0.01)		(0.01)	(0.00)		(0.00)	(0.00)		(0.01)	(0.00)
LogMB		0.18***	0.15***		0.28***	0.26***		0.14***	0.13***		0.34***	0.29***
		(0.00)	(0.01)		(0.01)	(0.00)		(0.00)	(0.00)		(0.01)	(0.01)
SDReturn		0.29***	0.33***		0.10	0.23		0.30***	0.35***		0.30***	0.35*
		(0.08)	(0.07)		(0.24)	(0.21)		(0.08)	(0.06)		(0.18)	(0.18)
InvPrice		0.00***	0.00***		0.00***	0.00***		0.00***	0.00***		0.00***	0.00***
		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)
AvgReturn		−0.34***	−0.40***		−1.53***	−1.56***		−0.40***	−0.46***		−1.35***	−1.39***
		(0.10)	(0.10)		(0.13)	(0.00)		(0.09)	(0.01)		(0.14)	(0.14)
Adj. R^2	0.004	0.02	0.06		0.05	0.09	0.003	0.01	0.05	0.008	0.06	0.13
Time FE	N	N	Y	N	N	Y	N	N	Y	N	N	Y
Country FE	N	N	Y	N	N	Y	N	N	Y	N	N	Y
Observations	312,125	312,125	312,125	133,139	133,139	133,139	383,056	383,056	383,056	62,208	62,208	62,208
Number of investors	5169	5169	5169	1052	1052	1052	6064	6064	6064	157	157	157
	Non-NZ			NZ			No SI initiatives			All SI initiatives		
	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3
Intercept	0.62***	0.38***	0.57***	0.82***	0.33***	0.34***	0.63***	0.32***	0.60***	0.88***	−0.10***	−0.15***
	(0.01)	(0.03)	(0.02)	(0.01)	(0.06)	(0.06)	(0.01)	(0.03)	(0.03)	(0.01)	(0.06)	(0.06)
UnsustainableDummy	0.03***	0.06***	0.01	0.08***	0.10***	0.13***	0.04***	0.06***	−0.01	0.16***	0.20***	0.23***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
SustainableDummy	0.22***	0.17***	0.14***	0.36***	0.23***	0.24***	0.20***	0.17***	0.11***	0.38***	0.31***	0.27***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
LogSize		0.02***	0.00		0.04***	0.05***		0.03***	0.00		0.10***	0.11***
		(0.00)	(0.00)		(0.01)	(0.01)		(0.00)	(0.00)		(0.01)	(0.01)
LogMB		0.15***	0.14***		0.35***	0.30***		0.13***	0.11***		0.42***	0.36***
		(0.00)	(0.00)		(0.01)	(0.01)		(0.01)	(0.01)		(0.01)	(0.01)
SDReturn		0.32***	0.36***		0.16	0.21		0.28***	0.31***		0.16***	−0.17
		(0.08)	(0.06)		(0.26)	(0.28)		(0.07)	(0.06)		(0.15)	(0.15)
InvPrice		0.00***	0.00***		0.00***	0.00***		0.00***	0.00***		0.00***	0.00***
		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)
AvgReturn		−0.47***	−0.50***		−1.38***	−1.43***		−0.24***	−0.25**		−2.34***	−2.16***
		(0.09)	(0.10)		(0.15)	(0.17)		(0.11)	(0.13)		(0.24)	(0.28)
Adj. R^2	0.003	0.02	0.05	0.007	0.05	0.14	0.002	0.01	0.05	0.007	0.08	0.19
Time FE	N	N	Y	N	N	Y	N	N	Y	N	N	Y
Country FE	N	N	Y	N	N	Y	N	N	Y	N	N	Y
Observations	396,626	396,626	396,626	48,638	48,638	48,638	194,411	194,411	194,411	21,326	21,326	21,326
Number of investors	6073	6073	6073	148	148	148	5179	5179	5179	56	56	56

Note. Columns labeled with Eq. (1), Eq. (2), and Eq. (3) depict the results using Equation (1), Equation (2), and Equation (3), respectively. Estimates are presented in percentages. Standard errors are presented in the parentheses. We control multiple company level attributes and country and time fixed effects. *$P < 0.10$; **$P < 0.05$; ***$P < 0.01$.

investment behavior compared to non-signatories. Signatories invest more in both unsustainable and sustainable companies, compared to both neutral companies and non-signatories, although PRI members seem to invest slightly less in unsustainable companies than non-members. This result holds even when comparing investors that committed to all sustainability initiatives (PRI, IIGCC, NZ alliances) to those that did not commit to any of these initiatives. The investors that endorsed multiple sustainability initiatives invest more in unsustainable and sustainable stocks.

We furthermore compare investors that were early joiners of the PRI (joined in 2006) to late joiners (joined in 2018 and after). The former invest less in unsustainable companies (−0.06) relative to neutral companies, compared to late joiners who invest more in unsustainable companies (0.04). However, both invest similarly in sustainable companies (0.27). As shown in Table 3, these results are stable when controlling for company characteristics (Equation (2)) and country- and time-fixed effects (Equation (3)).

4.2. Normative pressure on investors

Relative to their ownership of companies with a neutral sustainability profile, we find that investors that face greater normative pressure invest less in unsustainable companies, yet do not invest more in sustainable companies. This is in contrast to investors facing less normative pressure. Such investors invest more in both unsustainable and sustainable companies relative to neutral stocks. These results remain robust under all model specifications. Fig. 4 visualizes these results and Table 4 provides more detail.

4.3. Investors' home countries

In Fig. 5 and Table 5 we explore the four dimensions of home-country influences that may shape sustainable investing behavior.

First, we find investors from common law systems to invest more, and those from civil law systems to invest less, in unsustainable companies relative to their ownership of companies with a neutral sustainability profile (Fig. 5a). And although investors from civil law systems invest more in sustainable companies, those from common law systems

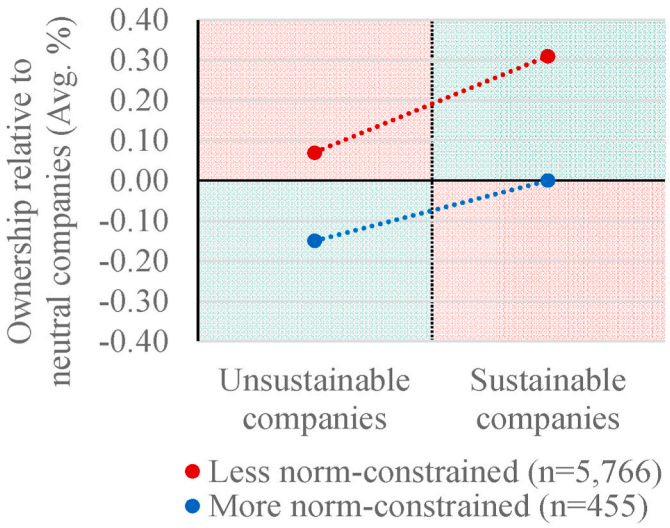

Fig. 4. | Normative pressure on investors. The graph displays ownership of unsustainable (n = 286) and sustainable companies (n = 351) relative to companies with neutral sustainability impacts (n = 477), comparing investors that are less norm-constrained investors (red) and more norm-constrained investors (blue). The green fields signal sustainable asset allocation behavior: investors that respectively invest less in unsustainable and more in sustainable companies relative to neutral peer companies. The red fields signal that investors overweight and underweight unsustainable and sustainable companies. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

in particular overweight investments in sustainable firms.

Second, we find that investors from countries with more extensive green central banking policies do not invest more sustainably compared to their peers from countries with a lower green finance commitment (Fig. 5b). Investors from both types of countries own comparable amounts of unsustainable, sustainable, and neutral companies compared to investors from countries with a lower green finance commitment.

Third, investors from countries that are highly committed to the SDGs tend to invest less in unsustainable and more in sustainable companies (Fig. 5c). Even though those from countries with lower commitment to the SDGs invest more in sustainable companies, they do not invest less in unsustainable firms.

Fourth, our results show that, relative to neutral companies, investors from countries that have moderate/high progress on the SDGs invest more in sustainable companies and comparably in unsustainable companies (Fig. 5d). Investors from countries that have poor progress towards reaching the SDGs invest more in unsustainable companies. Again, the results remain robust when controlling for characteristics of companies and fixed effects.

5. Implications

5.1. Theoretical implications

This study asked who the owners are of (un)sustainable companies, and what are institutional determinants of sustainable investing. The results show that there is no archetypal sustainable or unsustainable investor. Rather, the extent to which individual investors own (un)sustainable companies varies considerably. We explain this variety by assessing how diverse institutional determinants – covering regulatory, normative, and cultural-cognitive institutions – influence ownership of (un)sustainable companies. Table 6 summarizes the findings.

Contrary to hypothesis 1, sustainable investing initiatives do not lead to more sustainable investing practices. Both signatories and non-members of these initiatives invest similarly in (un)sustainable companies. Because these initiatives encourage stewardship it is possible that signatories intentionally invest in unsustainable companies and use active ownership to push for improved sustainability performance. This can be a good sustainable investing strategy (Edmans et al., 2022). However, recent studies do not support this proposition. Signatories of the PRI do not show meaningful support for sustainability in their engagement and voting at annual general meetings (Kim and Yoon, 2022). Our finding supports research indicating that PRI members do not exhibit more responsible investment behavior and raises concerns that such initiatives can promote greenwashing (Gibson Brandon et al., 2022; Kim and Yoon, 2022; Nofsinger and Varma, 2022). This implies that voluntary normative institutions may not be effective in changing their members' behavior.

Table 4
Normative pressure on investors.

	Less norm-constrained investors			More norm-constrained investors			All investors		
	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3
Intercept	0.65***	0.30***	0.27**	0.97***	1.19***	1.11*	0.69***	0.27***	0.26**
	(0.00)	(0.03)	(0.03)	(0.02)	(0.08)	(0.07)	(0.00)	(0.03)	(0.03)
UnsustainableDummy	0.07***	0.13***	0.13***	−0.17***	−0.19***	−0.15**	0.04***	0.10***	0.10***
	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)	(0.01)
SustainableDummy	0.31***	0.22***	0.22***	0.01	0.04	0.00**	0.27***	0.20***	0.20***
	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)
LogSize		0.04***	0.04***		−0.03***	−0.02***		0.04***	0.04***
		(0.00)	(0.00)		(0.01)	(0.01)		(0.00)	(0.00)
LogMB		0.24***	0.24***		−0.02	−0.06***		0.21***	0.20***
		(0.00)	(0.00)		(0.01)	(0.00)		(0.00)	(0.00)
SDReturn		−0.01	0.05		0.24**	0.09		0.37***	0.39***
		(0.11)	(0.63)		(0.10)	(0.36)		(0.10)	(0.00)
InvPrice		0.00***	0.00***		0.00***	0.00***		0.00***	0.00***
		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)
AvgReturn		−0.95***	−1.03***		0.25	0.73**		−0.79***	−0.82***
		(0.08)	(0.00)		(0.35)	(0.04)		(0.08)	(0.00)
Adj. R^2	0.007	0.04	0.04	0.001	0.01	0.01	0.005	0.03	0.03
Time FE	N	N	Y	N	N	Y	N	N	Y
Country FE	N	N	Y	N	N	Y	N	N	Y
Observations	400,393	400,393	400,393	44,871	44,871	44,871	445,264	445,264	445,264
Number of investors	5766	5766	5766	455	455	455	6221	6221	6221

Note. Columns labeled with Eq. (1), Eq. (2), and Eq. (3) depict the results using Equation (1), Equation (2), and Equation (3), respectively. Estimates are presented in percentages. Standard errors are presented in the parentheses. We control multiple company level attributes and country and time fixed effects. *$P < 0.10$; **$P < 0.05$; ***$P < 0.01$.

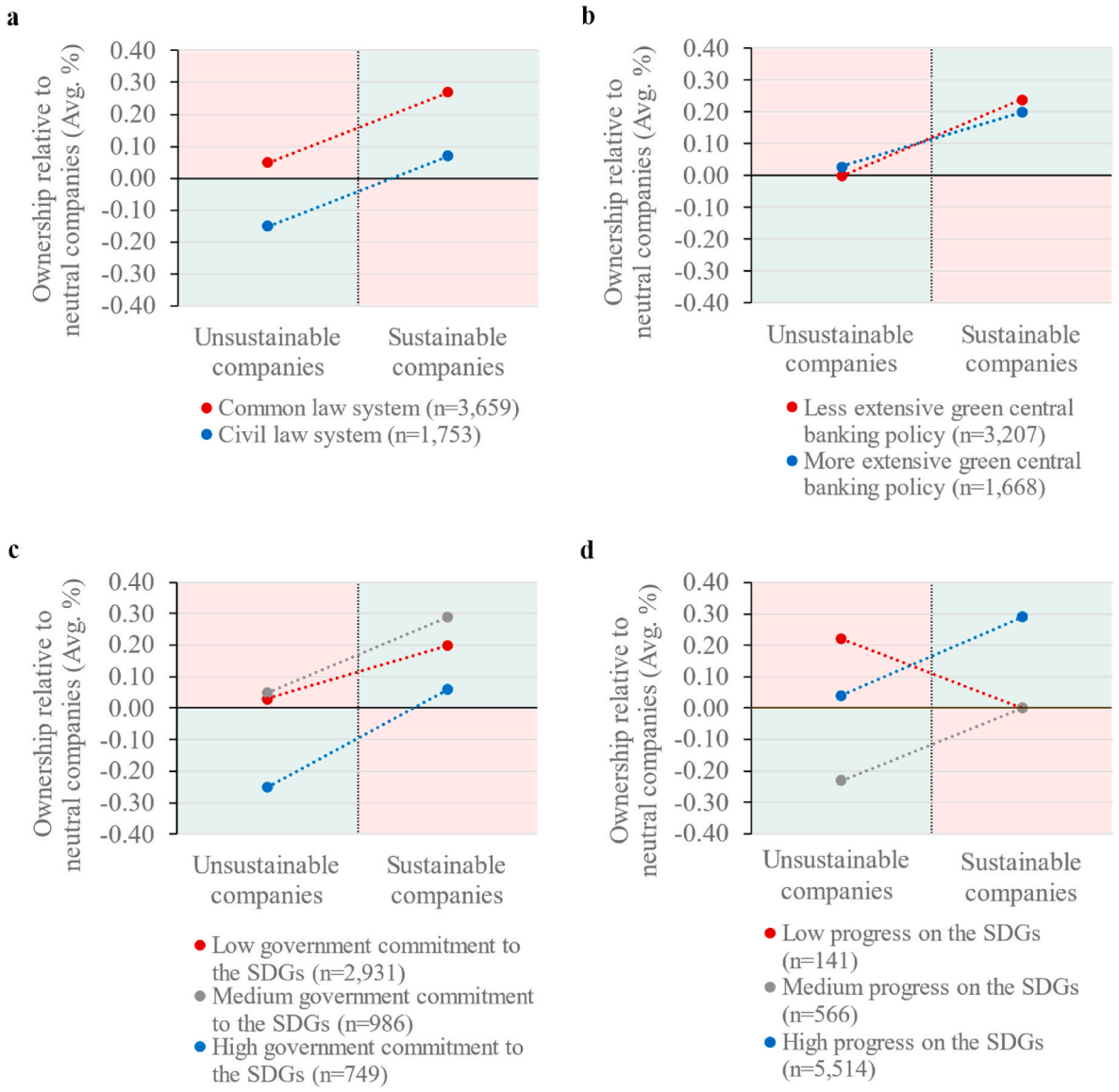

Fig. 5. | Investors' home countries. The graph displays ownership of unsustainable (n = 286) and sustainable companies (n = 351) relative to companies with neutral sustainability impacts (n = 477), comparing investors that are from countries characterized by: **a,** common law (red) and civil law (blue) systems; **b,** less extensive (red) and more extensive (blue) green central banking policies; **c,** low (red), middle (grey), and high (blue) governmental commitment to the SDGs; **d,** low (red), middle (grey), and high (blue) progress towards achieving the SDGs. Green fields signal sustainable investment behavior: investors that respectively invest less in unsustainable and more in sustainable companies relative to neutral peer companies. Red fields signal that investors overweight and underweight unsustainable and sustainable companies. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

Moreover, this paper contributes to the discussion on early and late adopters of sustainable investing initiatives. Prior research found that early adopters of the PRI demonstrate better ESG integration compared to late-joiners (Bauckloh et al., 2021). Consistent with this, our findings indicate that early adopters invest less in unsustainable companies than late adopters. Furthermore, we find that early adopters do not significantly increase their investment in companies that contribute to sustainable development. This complementary perspective suggests that early adopters of sustainable investing initiatives focus on reducing their ownership of unsustainable companies to 'avoid harm' rather than actively increasing their ownership of sustainable firms to 'do good'.

The findings also shed light on the role of normative pressure in promoting sustainable investment. Pressure to comply with social norms is a cultural-cognitive institution that is correlated with lower investments in unsustainable companies, while it has no significant relationship with higher investment in sustainable ones. This partially supports hypothesis 2. Our findings align with scholarship emphasizing that companies have stronger ethical duties to prevent negative impact compared to creating positive impact (Crilly et al., 2016; Lin-Hi and Müller, 2013) and extends research showing that normative pressure motivates companies to engage more with the SDGs to 'avoid harm' rather than to actively 'do good' (van Zanten and van Tulder, 2018). Investors facing less normative pressure tend to hold significant positions in both unsustainable and sustainable firms, possibly reflecting their expectation of success for either or both types of companies in the future (depending on if they have long/short positions).

Furthermore, this paper shows that investors' home countries influence ownership of (un)sustainable companies. A more inclusive legal system – that addresses the needs of diverse stakeholders - and stronger governmental commitment to the SDGs are associated with lower ownership of unsustainable companies. This partially aligns with hypotheses 3a and 3c, suggesting that regulation can promote 'avoiding harm'. Countries can furthermore promote sustainable investing through dedicated legislation. Although green central banking policies

Table 5
Investors' home countries.

	Legal system						Green central banking policy					
	Common			*Civil*			*Less*			*More*		
	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3
Intercept	0.81***	0.56***	0.54***	0.61***	0.70***	0.63***	0.96***	0.60***	0.57***	0.44***	0.67***	0.68***
	(0.01)	(0.03)	(0.03)	(0.01)	(0.03)	(0.03)	(0.01)	(0.03)	(0.03)	(0.01)	(0.03)	(0.03)
UnsustainableDummy	0.05***	0.13***	0.10***	−0.15***	−0.12***	−0.08***	0.00	0.09***	0.11***	0.03**	0.04***	0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
SustainableDummy	0.27***	0.23***	0.21***	0.07***	0.02**	0.11	0.24***	0.20***	0.21***	0.20***	0.13***	0.16***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01	(0.01)	(0.01)
LogSize		0.01***	0.02***		−0.01	0.00***		0.03***	0.03***		−0.03***	−0.04***
		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)
LogMB		0.25***	0.23***		0.08***	0.10***		0.25***	0.25***		0.17***	0.17***
		(0.00)	(0.00)		(0.01)	(0.01)		(0.01)	(0.01)		(0.00)	(0.00)
SDReturn		0.14	0.25**		−0.62***	−0.57***		−0.41***	−0.40***		0.35***	0.40***
		(0.10)	(0.10)		(0.08)	(0.08)		(0.06)	(0.07)		(0.09)	(0.10)
InvPrice		0.00***	0.00***		0.00***	0.00*		0.00***	0.00***		0.00***	0.00***
		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)
AvgReturn		−1.00***	−1.10***		−0.46***	−0.55***		−1.47***	−1.53***		−0.73***	−0.87***
		(0.11)	(0.12)		(0.12)	(0.13)		(0.13)	(0.14)		(0.10)	(0.11)
Adj. R^2	0.005	0.03	0.04	0.004	0.01	0.07	0.003	0.03	0.03	0.006	0.03	0.05
Time FE	N	N	Y	N	N	Y	N	N	Y	N	N	Y
Country FE	N	N	Y	N	N	Y	N	N	Y	N	N	Y
Observations	296,304	296,304	296,304	91,914	91,914	91,914	236,174	236,174	236,174	117,212	117,212	117,212
Number of investors	3659	3659	3659	1753	1753	1753	3207	3207	3207	1668	1668	1668

	SDG commitment								
	Low			Medium			High		
	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3
Intercept	0.96***	0.55***	0.51***	0.55***	0.84***	0.72***	0.65***	0.89***	0.78***
	(0.01)	(0.03)	(0.03)	(0.01)	(0.05)	(0.05)	(0.01)	(0.05)	(0.05)
UnsustainableDummy	0.03**	0.12***	0.11***	0.05***	0.11***	0.10***	−0.25***	−0.21***	−0.12***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.02)	(0.02)	(0.02)
SustainableDummy	0.20***	0.17***	0.20***	0.29***	0.23***	0.24***	0.06***	−0.02	0.09***
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
LogSize		0.03***	0.04***		−0.05***	−0.04***		−0.02***	−0.02***
		(0.00)	(0.00)		(0.01)	(0.01)		(0.01)	(0.01)
LogMB		0.26***	0.25***		0.19***	0.20***		0.10***	0.10***
		(0.01)	(0.01)		(0.01)	(0.01)		(0.01)	(0.01)
SDReturn		−0.28***	−0.21***		0.52***	0.62***		−0.95***	−0.70***
		(0.07)	(0.07)		(0.16)	(0.16)		(0.13)	(0.12)
InvPrice		0.00***	0.00***		0.00***	0.00***		0.00***	0.00***
		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)
AvgReturn		−1.48***	−1.58***		−0.80***	−1.10***		−0.51***	−0.42**
		(0.13)	(0.15)		(0.14)	(0.14)		(0.19)	(0.20)
Adj. R^2	0.002	0.03	0.04		0.03	0.05	0.007	0.01	0.08
Time FE	N	N	Y	N	N	Y	N	N	Y
Country FE	N	N	Y	N	N	Y	N	N	Y
Observations	209,500	209,500	209,500	104,495	104,495	104,495	47,012	47,012	47,012
Number of investors	2931	2931	2931	986	986	986	749	749	749

	SDG progress		
	Low	Medium	High

(*continued on next page*)

Table 5 (*continued*)

	SDG progress								
	Low			Medium			High		
	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3
	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3	Eq. 1	Eq. 2	Eq. 3
Intercept	0.81***	0.08	0.28	1.18***	−0.06	0.40	0.67***	0.22***	0.39***
	(0.03)	(0.18)	(0.20)	(0.07)	(0.26)	(0.29)	(0.00)	(0.03)	(0.03)
UnsustainableDummy	0.22***	0.11**	0.19***	−0.23***	−0.33***	−0.24***	0.04***	0.11***	0.04***
	(0.05)	(0.05)	(0.05)	(0.09)	(0.11)	(0.09)	(0.01)	(0.01)	(0.01)
SustainableDummy	0.18	0.15	−0.20	−0.09	−0.11	0.00	0.29***	0.21***	0.18***
	(0.13)	(0.13)	(0.13)	(0.12)	(0.16)	(0.13)	(0.01)	(0.01)	(0.01)
LogSize		0.10***	0.07**		0.15***	0.08**		0.04***	0.02***
		(0.02)	(0.03)		(0.04)	(0.04)		(0.00)	(0.00)
LogMB		−0.02	0.00		−0.13**	−0.08		0.22***	0.19***
		(0.03)	(0.03)		(0.06)	(0.05)		(0.00)	(0.00)
SDReturn		0.43	0.42		0.80	0.45		0.39***	0.44***
		(0.58)	(0.63)		(0.59)	(0.63)		(0.11)	(0.09)
InvPrice		0.04	0.03		−0.01	0.00		0.00***	0.00***
		(0.04)	(0.04)		(0.01)	(0.01)		(0.00)	(0.00)
AvgReturn		−1.01	−1.08		1.05	2.30**		−0.93***	−0.95***
		(0.74)	(0.87)		(1.07)	(1.15)		(0.08)	(0.08)
Adj. R^2	0.003	0.01	0.03	0.001	0.01	0.07	0.006	0.03	0.06
Time FE	N	N	Y	N	N	Y	N	N	Y
Country FE	N	N	Y	N	N	Y	N	N	Y
Observations	6127	6127	6127	8751	8751	8751	398,044	398,044	398,044
Number of investors	141	141	141	566	566	566	5514	5514	5514

Note. Columns labeled with Eq. (1), Eq. (2), and Eq. (3) depict the results using Equation (1), Equation (2), and Equation (3), respectively. Estimates are presented in percentages. Standard errors are presented in the parentheses. We control multiple company level attributes and country and time fixed effects. *$P < 0.10$; **$P < 0.05$; ***$P < 0.01$.

Table 6
Summary of findings.

Determinants of ownership of (un) sustainable companies	Unsustainable companies	Sustainable companies
Commitment to sustainable investing initiatives		
- PRI	+	+++
- Non-PRI	+	+++
- IIGCC	+	+++
- Non-IIGCC	+	++
- Net Zero	+	+++
- Non-Net Zero	+	+++
- All SI initiatives	++	+++
- No SI initiatives	+	++
Normative pressure and investments		
- High normative pressure	−	=
- Low normative pressure	+	+++
Investors' home countries		
Legal system		
- Common law	+	+++
- Civil law	−	+
Green central banking policies		
- Less	=	+++
- More	+	++
SDG commitment		
- Low	+	++
- Medium	+	+++
- High	−−−	+
SDG progress		
- Low	+++	=
- Medium	−−−	=
- High	+	+++

Note. "+", "−", and " = " symbols refer to the magnitude of ownership of (un) sustainable stocks relative to neutral companies. "+++" coefficients >0.2; "++" coefficients 0.2–0.1; "+" coefficients 0.1–0.0; " = " coefficients 0.0; "-" coefficients 0.0 to −0.1; "–" coefficients −0.1 – 0.2; "—" coefficients < −0.2. Coefficients are the ownership percentage relative to neutral stocks.

do not result in more sustainable investing practices, contrasting hypothesis 3b, this may change. Green central banking policies are in their infancy (Campiglio et al., 2018) but new sustainable investing legislations are increasingly emerging. The European Union's Sustainable Finance Action Plan is an example. In time, such regulatory initiatives may influence ownership of (un)sustainable companies.

Finally, a country's level of SDG attainment corresponds to sustainable investing practices. Investors from less developed countries invest more in unsustainable companies. Most of these companies support social goals but cause significant environmental harm. An example is a utility distributing power generated from thermal coal. Although it enables access to electricity, it also contributes to global warming. In contrast, investors from highly developed countries have higher ownership of sustainable companies, which can be a result of having a broader investment universe and facing stronger norms against investing in unsustainable companies. This is in line with hypothesis 3d. These findings are analogous to the environmental Kuznets curve (Sarkodie and Strezov, 2019), but then applied to investors and focusing on a broader notion of social-ecological sustainability.

5.2. Managerial implications

We highlight three managerial implications.

First, sustainable investing demands more of investors than committing to sustainable investing initiatives. While this can be a good first step, investors need to follow-through to ensure that assets are more sustainably allocated. To promote this, sustainable investing initiatives could develop transparency and accountability mechanisms.

Second, sustainable investing requires knowing which companies are more/less sustainable. Yet there is confusion around how to measure sustainability performance (Berk and van Binsbergen, 2021; van Zanten and Huij, 2022). Investors are therefore encouraged to adopt improved sustainability ratings in the investment process, ideally ones that are supported by sustainability science and intergovernmental agreements like the SDGs.

Third, a vast share of assets globally is invested passively but sustainable investing necessitates making active decisions. It is imperative to develop new ways for balancing returns, risk, and sustainability in the investment process. Moreover, because indices exert a strong imprint on which companies are invested in, we encourage index providers to explore how sustainable indices can be mainstreamed.

5.3. Limitations and future research

This paper studied how determinants in an investor's institutional environment can shape sustainable asset allocation. Naturally, there may be other determinants of sustainable investing. For example, investors may specialize in sustainable investing to obtain a competitive advantage. Such potential determinants outside of institutionalism were beyond this study's scope. Further research can help explore the role of additional determinants for sustainable investing.

The study also invites research on the sustainable investing options available for 'universal owners'. These are investors that own/manage such a substantial portion of global wealth that they need to build well-diversified portfolios to avoid large systemic risks. However, avoiding unsustainable and preferring sustainable stocks limits the universe of companies that can be invested in, thereby reducing opportunities for diversification. Future research on the systemic risks presented by the Anthropocene, in conjunction with the need for large investors to build well-diversified portfolios, stands to make important contributions to the sustainable investing literature.

Moreover, our results suggest that institutions vary significantly in their support to sustainable investing. Investors operate in a complex institutional environment. Various institutions, like the determinants covered in this study, call for more sustainable investment behavior. At the same time, investors face institutions that could conflict with sustainable development ambitions. To illustrate, investors have fiduciary duties to ensure good financial performance. Research on the efficacy of potentially conflicting institutions in promoting sustainable investing, for instance through event-studies or natural experiments, can build upon our findings.

6. Conclusion

Attaining the SDGs, realizing the Paris Agreement, and managing Anthropocene risks more generally, requires financial flows to align with a more sustainable future (Campiglio et al., 2018; Galaz et al., 2018; Keys et al., 2019; Sachs et al., 2019; Shrivastava et al., 2019). This makes investors, who can allocate capital to sustainable but also to unsustainable activities, important actors in sustainable development. This paper assessed who the main owners are of sustainable and unsustainable companies. Using institutional theory, it then explored determinants that explain why an investor is inclined to invest sustainably.

Our results contribute a better understanding of the conditions under which sustainable investors can align with sustainable development. We found that: (i) sustainable investing initiatives, which are highly popular among investors, are not very effective in channeling financing away from unsustainable and towards sustainable companies; (ii) normative pressure matters: investors facing higher normative constraints invest less in unsustainable companies; and (iii) the home country of an investor influences sustainable investing practice through the type of legal system that characterizes the country, via the extent to which the government is committed to the SDGs, and by how well the country is progressing towards achieving the SDGs.

These findings encourage sustainable investing initiatives to develop accountability mechanisms that induce their signatories to invest more sustainably. They also suggest that increased normative pressure can

help shift capital away from unsustainable activities. And they indicate that home-country contexts moderate the extent to which investors allocate to (un)sustainable companies. Overall, the findings encourage a critical examination of institutional efficacy in promoting sustainable investing.

CRediT authorship contribution statement

Jan Anton van Zanten: Conceptualization, Methodology, Writing – review & editing, Supervision. **Bruno Rein:** Methodology, Formal analysis, Writing – original draft.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The authors are or have been employed by Robeco. The views expressed in this paper are not necessarily shared by Robeco.

Data availability

Data will be made available on request.

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